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THE
ONTARIO WATER RESOURCES
COMMISSION

WATER POLLUTION SURVEY

of the

TOWNSHIP OF WHITNEY

DISTRICT OF COCHRANE

1967

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1967

Report on a water pollution
survey of the township of
Whitney, district of Cochrane.
80850

R E P O R T

on a

WATER POLLUTION SURVEY

of the

TOWNSHIP OF WHITNEY

District of Cochrane

July 1967

District Engineers Branch
Division of Sanitary Engineering

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ONTARIO WATER RESOURCES COMMISSION

R E P O R T

INTRODUCTION

A water pollution survey was made of the Township of Whitney in September 1966. The purpose of the survey was to locate and record all significant sources of water pollution within the township. Such surveys are performed routinely by the Ontario Water Resources Commission as a basis for evaluating all existing and potential sources of pollution. When sources of pollution are found, corrective action is requested by the Commission. Where pollution control works appear desirable or expansions to present facilities are necessary, the Commission has a program to aid in the construction and financing of these works.

The information received from the township officials and mine personnel is gratefully acknowledged.

GENERAL INFORMATION

The Township of Whitney with a 1966 assessed population of 1,792 (1967 Municipal Directory) is located approximately 8 miles east of the Town of Timmins in the District of Cochrane.

There are three urbanized areas centrally located between Porcupine Lake and Bob's Lake; Porcupine, Pottsville and the Bob's Lake Subdivision. The approximate population of these areas is 1,000. Another subdivision called Lakeview is situated at the southwest end

of Porcupine Lake and adjacent to the community of South Porcupine in the Township of Tisdale. The population of the Lakeview subdivision is estimated at 250.

The Township of Whitney is included in the Porcupine Mining Area, which is Canada's leading gold mining centre, and economically, the populace relies on the numerous mining developments in the Porcupine district.

The township lies within the Frederick House River watershed. A general overburden of clay exists with some isolated areas of gravel. The topography of the land is generally flat with drainage to Porcupine Lake and the Porcupine River.

WATER USES

(1) Municipal

Water for the communities of Porcupine, Pottsville, and the Bob's Lake subdivision is supplied by the Township of Whitney municipal water works. Water is obtained from a 45-foot drilled well and pumped to a 100,000-gallon underground storage reservoir. The supply is then metered prior to being pumped to the distribution system.

Recharging of the ground-water aquifer is accomplished by utilizing water from Bob's Lake. Water flows by gravity via a ditch and galvanized pipe, to a wet well from which it is pumped to the gravel pit recharging area.

According to an OWRC water works report of February 1, 1967,

a total of 35 million gallons was pumped to the distribution system in 1966. This represented an average daily pumpage of 96,000 gallons. At the time of the inspection, a second drilled well and pumphouse had been constructed which would utilize the same aquifer as the original well. The expected pumpage of this well is 200 gpm.

The domestic water supply for the Lakeview Subdivision is provided by the Township of Tisdale municipal water works.

(2) Industrial

(a) Pamour Porcupine Mines Limited

Water for domestic requirements at the mine and mine townsite is obtained from Three Nations Lake. The water is chlorinated and pumped to a 104,000-gallon elevated storage tank included in the distribution system. The population served by this system is approximately 370 (mine buildings - 270; mine townsite - 100) with an average daily usage of approximately 35,000 gallons.

(b) Hallnor Mines Limited

Domestic water is obtained from a diamond-drill hole and pumped to the distribution system. The approximate population served at the mine buildings is 200 and at the mine townsite 87. It is estimated that an average of 7,000 gpd are used for domestic purposes.

Cooling water for industrial purposes is pumped from the Porcupine River at a rate of 200 gpm.

(c) Broulan Reef Mines Limited

The drinking water supply for the mine buildings and residences is transported in coolers from the Township of Whitney municipal water works. Water is also pumped from Hallnor Mines water works to three residences at the mine site and used for washing purposes only. Water for washing requirements in the mine dry and office buildings is pumped from an adjacent watercourse. Approximately eight persons live in residence and 30 are employed at the mine.

Water for industrial operations is pumped from the Porcupine River at a rate of 400 gpm.

(3) Recreational

There are two public beaches located in the Township of Whitney; one at the northeast end of Porcupine Lake and the other on the north shore of Bob's Lake. Some fishing is done in Porcupine Lake.

WATER POLLUTION

(1) Sanitary Waste Disposal

(a) Existing Conditions

(i) Porcupine

The Community of Porcupine is serviced by a separate sewer system. Of the 123 homes in this area, 93 are served by the municipal sanitary sewerage system. Domestic wastes from these residences are directed to a 15,000-gallon-capacity septic tank. The final effluent is discharged to the Porcupine River. The remaining homes not sewered

rely on septic-tank and tile-bed systems.

Surface drainage for the area is directed to Porcupine Lake and the Porcupine River via storm sewers and open ditches.

(ii) Pottsville

There are 117 residences in the Pottsville area; 92 of these are served by sanitary sewers. Domestic wastes are directed to a 23,000-gallon-capacity septic tank with effluent discharge to Porcupine Lake. Individual septic-tank and tile-bed systems are employed at the remaining homes.

Storm runoff discharges to Porcupine Lake.

(iii) Bob's Lake Subdivision

This subdivision consisting of 38 homes is served by sanitary sewers with domestic wastes directed to a lagoon. The lagoon has a surface area of 1.67 acres. The final effluent discharges to Bob's Creek, a tributary of Porcupine Lake.

(iv) Lakeview Subdivision

There are about 60 homes in this subdivision with a population of 250. The majority of the residences are served by septic-tank systems. The remainder is served by pit privies and also by the Township of Tisdale sanitary sewer system. In some cases where septic-tank systems are located there are direct discharges to roadside ditches. Also some sink wastes gain access to the drainage ditches.

(v) North Eastern Psychiatric Hospital

Domestic wastes from the hospital will be treated by a 4-acre lagoon system with effluent discharge to the Porcupine River. The hospital may accommodate 300 patients and have a staff of 150 on a 3-shift basis. At the time of the survey, the hospital was not in operation.

(b) Proposed Water Pollution Control Facilities

The Township of Whitney in conjunction with the Township of Tisdale has requested the Commission to develop a sewage works program. Both townships have also agreed to supply services for a proposed College of Applied Arts and Technology necessitating the realization of improved sewage-treatment works.

(2) Industrial Waste Disposal

(a) Pamour Porcupine Mines Limited

This gold mine has a production of 1,750 tons of ore per day. Industrial wastes are directed to a number of tailings dams with overflows to the Porcupine River.

Domestic sewage from the mine buildings and townsite are treated in 21 individual septic tanks. At the mine there is one septic tank serving the machine shop, change house and the office building. The combined effluents from the above tanks are directed to an 8-inch-diameter trunk sewer which outfalls to a small creek draining Three Nations Lake. This creek joins the Porcupine River

northeast of the mine site.

(b) Hallnor Mines Limited

This gold mining development produces approximately 300 tons of ore per day. Also, 500 tons of waste material are mined per day. Industrial wastes are pumped to tailings dams in the area. Cooling water used for the compressors is discharged to an open ditch which drains to the Porcupine River.

Domestic sewage from the mine dry and office building is directed to a septic tank of 7,300 gallons capacity. Effluent from this tank is directed to the drainage ditch also receiving cooling wastewater. A septic tank of capacity 3,850 gallons serves the mine townsite. The final effluent discharges to an open ditch, tributary to the Porcupine River.

(c) Broulan Reef Mines Limited

Texas Gulf Sulphur Company, under agreement with Broulan Reef Mines, is using the facilities of Broulan to mill rock for zinc and lead. Production is estimated at 350 tons per day. Mill wastes are pumped to tailings dams.

Sanitary wastes from three residences, mine office and mill flow by gravity to an 800-gallon septic tank. Final effluent is pumped to an open ditch which runs through a swamp and eventually drains to the Porcupine River.

(3) Discussion of Sample Analyses

The laboratory results of the bacteriological examinations and chemical analyses of samples collected from the watercourses and outfalls are included in the tables appended to this report. Descriptions of the tests and an outline of the OWRC objectives are also included.

Samples were collected from roadside ditches within the Lakeview subdivision. Bacteriological examinations revealed high coliform counts indicating that wastes from inadequate and malfunctioning septic-tank systems were gaining access to the ditches.

The effluent sample collected from the municipal septic tank in Pottsville revealed a 5-day BOD and suspended solids concentration in excess of the Commission's objectives of not greater than 15 ppm. Previous sample results shown in Table II have also indicated BOD and suspended solids concentration in excess of the objectives.

The final effluent sample from the Bob's Lake lagoon indicated that it was operating satisfactorily, with the suspended solids concentration and 5-day BOD being within the Commission's objectives. A sample collected from Bob's Creek downstream indicated the water quality to be satisfactory and not impaired by the lagoon discharge.

Bacteriological examination of samples collected from Porcupine Lake at Birch Hill and the Air Base showed the water quality

to be impaired, with coliform counts exceeding the Commission's objective of not greater than 2,400 coliforms.

A sample collected from the lake offshore from the Whitney Cemetery indicated the water quality to be satisfactory at this point. Bacteriological examination of a sample collected at the Porcupine beach showed a coliform count within the objective for bathing areas. As the bacteriological quality of the water varies throughout Porcupine Lake, it is recommended that bathing areas be sampled routinely during the summer season.

An effluent sample from the septic tank serving the community of Porcupine showed that this tank is also inadequate for providing proper treatment. Both the 5-day BOD and suspended solids concentration exceeded the Commission's objectives.

The effect on the water quality of the Porcupine River by the discharges of septic-tank effluents from the Township of Whitney and also the Township of Tisdale is shown by the results of downstream sampling. A sample collected from the Porcupine River downstream from Shallow Lake showed a coliform count of 43,000 organisms per 100 ml. This exceeds the Commission's objective of not greater than 2,400 coliforms per 100 ml. Another sample obtained from the river at the road to Reef Mines also revealed a coliform count in excess of the Commission's objective.

A sample of the final effluent from the septic tank serving

the Hallnor Mine buildings had a suspended solids concentration in excess of the Commission's maximum objective of 15 ppm. A high coliform density was also obtained. A cooling water sample was collected in the morning at the time of the investigation and it was found that the suspended solids concentration was above the recommended limit. A sample from the same cooling water outfall collected in the afternoon showed that the 5-day BOD and suspended solids concentration had increased and both exceeded the maximum objectives. A high coliform count and an ABS concentration was also obtained indicating domestic wastes were gaining access to the cooling water discharge. These effluents are directed to the Porcupine River. Bacteriological examination of the water quality of the Porcupine River at the Hallnor cooling-water intake downstream from the outfalls showed the water to be impaired with a coliform count of 4,300 coliforms per 100 ml, above the Commission's recommended limit for surface waters.

The effluent sample from the septic tank at the Broulan Reef Mines showed a suspended solids concentration and 5-day BOD in excess of the objectives. The effluent flows to a swampy area.

Bacteriological and chemical samples were collected from the outlet of Three Nations Lake upstream from the Pamour Mines septic-tank discharge. The quality of the water was within the objectives. The septic-tank effluents from Pamour Mines are directed to one trunk sewer which outfalls to the creek draining Three Nations

Lake. A high coliform density was shown in the discharge. Samples collected from the creek downstream from the outfall indicated the water quality to be impaired, with a 5-day BOD of 17 ppm, above the Commission's maximum objective of not greater than 4 ppm. Also, the coliform count was above the Commission's objective for surface waters.

REFUSE DISPOSAL

The municipal refuse disposal site is located on Lot 7, Concession 3 in the Township of Whitney. A burn-and-cover type of operation is employed at this dump and no water pollution problems exist as a result of the operation.

SUMMARY AND CONCLUSIONS

A water pollution survey was made of the Township of Whitney in September 1966.

There are three main areas of urbanization in the township; Porcupine, Pottsville, and the Bob's Lake subdivision. Domestic water is obtained from a well supply owned and operated by the Township of Whitney. The majority of the residences in Porcupine and Pottsville are served by sanitary sewers with wastes being directed to two municipal septic tanks. Bob's Lake subdivision is served by a waste stabilization pond.

Another urbanized area is the Lakeview subdivision located adjacent to the Township of Tisdale's community of South Porcupine.

Domestic water for the subdivision is supplied by the Township of Tisdale. Privately owned septic-tank systems are used for treating sanitary wastes.

The local gold mines and mine townsites utilize their own supply of water and are served by septic-tank systems. Tailings disposal basins are employed for industrial waste disposal with overflows to Porcupine River.

Bacteriological examination and chemical analyses of samples collected from the outfalls and watercourses within the township have shown that polluting wastes are being discharged to the local watercourses. The water quality of Porcupine Lake and the Porcupine River has become impaired with the discharge of final effluents from municipal septic tanks in the Township of Whitney and also the Township of Tisdale. The present sewage disposal systems are inadequate and further sewage treatment facilities should be provided. The mining companies also with septic-tank effluents discharging to local watercourses should improve their facilities.

The townships of Whitney and Tisdale have requested this Commission to develop a joint sewage works scheme. The townships have also agreed to supply water and sewage services for a proposed College of Applied Arts and Technology.

RECOMMENDATIONS

1. The Township of Whitney, in conjunction with the Township of Tisdale, should continue its efforts to provide adequate sewage treatment facilities in the township.

2. The Pamour Porcupine Mines Limited and Hallnor Mines Limited should provide improved facilities for the treatment of domestic wastes.

3. Bathing areas within the township should be sampled for bacteriological examination on a regular basis during the summer season.

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APPENDIX

WATER QUALITY AND EFFLUENT OBJECTIVES

The OWRC objectives for surface waters in Ontario are as follows:

5-day BOD	- not greater than 4 ppm
Total Coliform Count	- not greater than 2,400 coliforms per 100 ml
Phenolic Equivalents	- average - not greater than 2 ppb maximum - not greater than 5 ppb
pH Range	- 6.7 to 8.5

A few pertinent maximum limits of contaminants in storm sewers, sewage treatment plant and industrial waste effluents are listed below. Adequate protection for surface waters, except in certain specific instances influenced by local conditions, should be provided if the concentrations and pH range are not exceeded.

5-day BOD	- not greater than 15 ppm
Suspended Solids	- not greater than 15 ppm
Phenols	- not greater than 20 ppb
pH	- 5.5 to 10.6
Iron	- not greater than 17 ppm
Ether Solubles (oil)	- not greater than 15 ppm

GLOSSARY OF TERMS

Bacteriological Examinations

The Most Probable Number technique is used by the Ontario Department of Health to obtain an approximation of the actual number of coliform organisms present. The Membrane Filter technique is used by the OWRC to obtain a direct count of coliform organisms. These organisms are the normal inhabitants of the intestines of man and

other warm-blooded animals. They are always present in large numbers in untreated sewage and are, in general, relatively few in number in other stream pollutants.

Biochemical Oxygen Demand (BOD)

The biochemical oxygen demand test indicates the amount of oxygen required for stabilization of the decomposable organic matter found in sewage, sewage effluent, polluted waters, or industrial wastes, by aerobic biochemical action. The time and temperature used are 5 days and 20°C, respectively.

Solids

The analyses for solids include tests for total, suspended and dissolved solids. The total solids is a measure of the solids in solution and in suspension. Suspended solids indicate the measure of undissolved solids of organic or inorganic nature whereas the dissolved solids are a measure of those solids in solution.

Oils and Ether Soluble Materials

These include oils and all other ether soluble materials such as tarry substances and greases. The presence of these pollutants renders water difficult and sometimes impractical to treat either for industrial or domestic use. Oils make streams unsightly and water unfit for bathing.

Phenolic Compounds

Phenols react with chlorine to produce intensely aromatic

compounds. These compounds, even when highly diluted, may give a taste and odour to the water which is variously described as medicinal, chemical or iodoform. Phenols taint fish and are toxic to fish, depending on the concentration. Normal water contains no phenolic compounds.

Alkyl Benzene Sulfonate (ABS)

The alkyl benzene sulfonate portion of the anionic detergents is reported in ppm. The test is generally employed to indicate the presence of domestic wastewater.

The popular use of synthetic detergent for general cleaning purposes has resulted in the incidence of residual ABS in streams. As an objective, the ABS concentration should not exceed 0.5 ppm in water used for domestic purposes.

TABLE I

TABULATION OF ANALYTICAL RESULTS

SAMPLING POINT NO.	DESCRIPTION	DATE	5-DAY BOD (PPM)	SOLIDS			TURBIDITY UNITS	MPN		MF COLIFORM COUNT PER 100 ML
				TOTAL (PPM)	SUSP. (PPM)	DISS. (PPM)		TOTAL COLIFORM ORGANISMS PER 100 ML	FAECAL COLI. ORGANISMS PER 100 ML	
P-23.7 D-1	LAKEVIEW SUBDIVISION - OPEN DITCH AT LAWTHER STREET	SEPT. 23/66								730,000
P-23.7 D-2	LAKEVIEW SUBDIVISION - OPEN DITCH AT GENERAL STORE	SEPT. 23/66								1,140
P-23.7 D-3	LAKEVIEW SUBDIVISION - OPEN DITCH AT RAILROAD STREET	SEPT. 23/66	8.0	364	52	312				240,000
PP-23.0	PORCUPINE LAKE AT BIRCH HILL	SEPT. 18/66	1.5	472	4	468		4,600	240	
PP-22.5	PORCUPINE LAKE AT WHITNEY CEMETERY	SEPT. 18/66	1.5	496	7	489		150	23	
PPB-0.2	BOB'S CREEK AT BACK ROAD	SEPT. 18/66	2.8	248	11	237		75	0	
PPB-1.2 T	BOB'S LAKE SUBDIVISION WPCP FINAL LAGOON EFFLUENT	SEPT. 19/66	4.8	274	12	262	FILTERED BOD 3.8	2,400	23	
PPB-1.2	BOB'S CREEK UPSTREAM FROM LAGOON OUTFALL	SEPT. 18/66	1.3	190	3	187		240	0	
PPB-1.6	BOB'S LAKE	SEPT. 18/66	1.8	180	5	175		1,100	75	

SAMPLING POINT NO.	DESCRIPTION	DATE	5-DAY BOD (PPM)	SOLIDS			TURBIDITY UNITS	MPN		MF COLIFORM COUNT PER 100 ML
				TOTAL (PPM)	SUSP. (PPM)	DISS. (PPM)		TOTAL COLIFORM ORGANISMS PER 100 ML	FAECAL COLI. ORGANISMS PER 100 ML	
PPB-1.80	BOB'S LAKE AT PARK BEACH	SEPT. 19/66	1.1	166	2	164		1,500	0	
PPB-1.81	BOB'S LAKE AT PARK BEACH	SEPT. 19/66						460	23	
PP-22.1	PORCUPINE LAKE AT AIR BASE	SEPT. 23/66	2.2	494	4	490		43,000	1,100	
PP-21.9 T	POTTSVILLE WPCP SEPTIC- TANK FINAL EFFLUENT	SEPT. 19/66	74	572	93	479		24,000,000	11,000,000	
PP-21.7	PORCUPINE LAKE AT PORCUPINE BEACH	SEPT. 18/66	1.4	502	10	492		1,100	23	
P-21.6	PORCUPINE RIVER DOWN- STREAM FROM PORCUPINE LAKE AT HWY #101	SEPT. 20/65 SEPT. 19/66	2.2 1.4	464 476	3 4	461 472		4,300 240	0 0	
P-21.5 T	PORCUPINE WPCP SEPTIC- TANK FINAL EFFLUENT	SEPT. 19/66	90	604	136	468		24,000,000	2,100,000	
P-21.2 T	NORTH EASTERN PSYCHIATRIC HOSPITAL WPCP - FINAL EFFLUENT	SEPT. 19/66	CONSTRUCTION NOT COMPLETED							
P-21.1	PORCUPINE RIVER DOWN- STREAM FROM SHALLOW LAKE	SEPT. 23/66	1.7	460	3	457		43,000	9,300	
P-19.9 D	TRIBUTARY TO PORCUPINE RIVER AT ROAD TO HALLNOR MINE	SEPT. 23/66	1.3	540	2	538		460	0	
P-19.9 T	BROULAN REEF MINES WPCP FINAL SEPTIC-TANK EFFLUENT	SEPT. 22/66	82	684	60	624		24,000,000	210,000	
P-19.6	PORCUPINE RIVER AT ROAD TO REEF MINES	SEPT. 23/66	1.0	506	2	504		240,000	460	

SAMPLING POINT NO.	DESCRIPTION	DATE	5-DAY BOD (PPM)	SOLIDS			ANIONIC DETERGENTS AS ABS	MPN	
				TOTAL (PPM)	SUSP. (PPM)	DISS. (PPM)		TOTAL COLIFORM	FAECAL COLIFORM
								ORGANISMS PER 100 ML	ORGANISMS PER 100 ML
P-19.3 T	HALLNOR MINES WPCP FINAL SEPTIC-TANK EFFLUENT	SEPT. 22/66	14	600	29	571		4,600,000	15,000
P-19.3 I	HALLNOR MINES - COOLING WATER EFFLUENT	SEPT. 22/66	14 300	1002 1014	145 212	857 802	SAMPLED AT 11:30 A.M. SAMPLED 0.4 AT 3:30 PM	240 15,000	0 240
P-19.2	PORCUPINE RIVER AT HALLNOR MINES COOLING WATER INTAKE	SEPT. 23/66	1.4	502	1	501		4,300	240
PTN-3.6	THREE NATIONS LAKE AT OUTLET TO CREEK	SEPT. 22/66	1.4	168	2	166		2,400	0
PTN-3.5 T	PAMOUR MINES WPCP FINAL SEPTIC-TANK EFFLUENT	SEPT. 22/66	10	374	3	371		24,000,000	150,000
PTN-3.4	CREEK DOWNSTREAM FROM PAMOUR WPCP OUTFALL	SEPT. 22/66	17	292	12	280		24,000,000	240,000
PTN-1.8	CREEK AT HIGHWAY #101	SEPT. 22/66	1.8	326	7	319		150	0

TABLE II
SUMMARY OF ANALYSES

PORCUPINE FIRST STREET SEPTIC TANK

<u>Date</u>	<u>Raw Sewage</u>		<u>Final Effluent</u>		<u>% Removal</u>	
	<u>BOD</u> <u>(ppm)</u>	<u>Susp.Solids</u> <u>(ppm)</u>	<u>BOD</u> <u>(ppm)</u>	<u>Susp.Solids</u> <u>(ppm)</u>	<u>BOD</u>	<u>Susp.Solids</u>
July 13/62*	180	206	75	117	58.3	43.2
Jan. 31/63	325	241	60	72	81.6	70.2
June 25/63	128	104	58	56	54.7	46.1
June 14/64	16	30	18	28	-	6.7
Dec. 3/65	88	74	37	34	58.0	54.0
May 10/66	70	144	24	71	65.8	50.6
Sept. 19/66	140	134	90	136	35.7	-

POTTSVILLE SEPTIC TANK

July 13/62*	140	238	75	74	46.4	68.9
Jan. 31/63	130	103	120	135	7.7	-
June 25/63	1.8	8	16	19	-	-
June 14/64	10	16	21	42	-	-
Dec. 3/65	56	52	38	37	32.1	28.8
May 10/66	2.1	1	19	89	-	-
Sept. 19/66	165	162	74	93	55.2	42.6

* Composite Sample



ONTARIO WATER RESOURCES COMMISSION

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